(5)

[JP,2002-267677,A]

[Claim(s)]

[Claim 1] An extraction means to extract blood from in the living body in the substrate made of one or more resin, Among separation means to separate a blood serum from a filtration means to filter the blood concerned extracted at least and to obtain plasma, or the blood concerned, one of means, An analysis means to analyze the matter in the blood concerned, and the extraction means concerned, the filtration means concerned, the separation means concerned and a passage means to connect the analysis means concerned, The extraction means concerned, the filtration means concerned, the separation means concerned, the analysis means concerned, and the migration means to which the component of the blood concerned which exists in the passage means concerned is moved, The control means for controlling actuation of at least one means of the output means for taking out the information from the analysis means concerned outside, the extraction means concerned and the filtration means concerned, the separation means concerned, the analysis means concerned, the migration means concerned, and the output means concerned, Hemanalysis equipment characterized by mainly covering with silicon oxide the front face of a part where the component extracted from the blood or blood of the migration means concerned touches in hemanalysis equipment equipped with the maintenance means made of the resin for holding the component of the blood concerned in the substrate concerned.

[Claim 2] Part or all of the passage means concerned that connects before and after the migration means concerned and the migration means concerned in hemanalysis equipment according to claim 1, And the gas of the molecule which contains silicon in a part of maintenance means concerned as a configuration element at least, and the molecule which contains oxygen as configuration elements at least is introduced. The manufacture approach of the hemanalysis equipment which covers with silicon oxide the front face of a part where the component which was made to generate the plasma of a capacity mold or an induction type in each means concerned, and was extracted from the blood or blood of each means concerned touches.

[Claim 3] The manufacture approach of the hemanalysis equipment characterized by for the molecule which contains especially silicon as a configuration element being TEOS (a tetra-ethoxy silane, Si4 (OC2H5)) in the manufacture approach of hemanalysis equipment according to claim 2, and the molecule which contains oxygen as a configuration element being oxygen (O2).

[Claim 4] Part or all of the passage means concerned that connects before and after the migration means concerned and the migration means concerned in hemanalysis equipment according to claim 1, And the gas of the molecule which contains silicon in a part of maintenance means concerned as a configuration element at least, the atom which contains oxygen as configuration elements at least, or a molecule is introduced. The manufacture approach of the hemanalysis

equipment which covers with silicon oxide the front face of a part where the component extracted from the blood or blood of each means concerned touches.

[Claim 5] The manufacture approach of the hemanalysis equipment characterized by for the molecule which contains especially silicon as a configuration element being TEOS (a tetra-ethoxy silane, Si4 (OC2H5)) in the manufacture approach of hemanalysis equipment according to claim 4, and the molecule which contains oxygen as a configuration element being ozone (O3).

[Claim 6] The manufacture approach of the hemanalysis equipment characterized by for the molecule which contains especially silicon as a configuration element being TEOS (a tetra-ethoxy silane, Si4 (OC2H5)) in the manufacture approach of hemanalysis equipment according to claim 4, and the molecule which contains oxygen as a configuration element being an oxygen atom.

[Claim 7] Part or all of the passage means concerned that connects before and after the migration means concerned and the migration means concerned in hemanalysis equipment according to claim 1, And the gas of the molecule which contains silicon in a part of maintenance means concerned as a configuration element at least, the atom which contains oxygen as configuration elements at least, or a molecule is introduced. The manufacture approach of the hemanalysis equipment which covers with silicon oxide the front face of a part where the component extracted from the blood or blood of each means concerned by irradiating light touches each means concerned.

[Claim 8] The manufacture approach of the hemanalysis equipment characterized by for the molecule which contains especially silicon as a configuration element being a silane (SiH4) in the manufacture approach of hemanalysis equipment according to claim 7, and the molecule which contains oxygen as a configuration element being oxygen (O2).

[Claim 9] The manufacture approach of the hemanalysis equipment characterized by for the molecule which contains especially silicon as a configuration element being TEOS (a tetra-ethoxy silane, Si4 (OC2H5)) in the manufacture approach of hemanalysis equipment according to claim 7, and the molecule which contains oxygen as a configuration element being oxygen (O2).

[Claim 10] The manufacture approach of the hemanalysis equipment characterized by containing the wavelength component of an ultraviolet area especially in the light to irradiate in the manufacture approach of hemanalysis equipment according to claim 7.

[Claim 11] reforming the front face of a part where the part or the component which introduced a gas into a part of the maintenance means concerned , made all generate the plasma of a capacity mold or an induction type in each means concerned , and extracted from the blood or the blood of each means concerned of passage means concerned connect before and after the migration means concerned and the migration means concerned touches in hemanalysis equipment according to claim 1 — the manufacture approach of the hemanalysis equipment characterize by things .

[Claim 12] The manufacture approach of hemanalysis equipment that the part or the gas all introduced into a part of maintenance means concerned of passage means concerned to connect before and after a migration means according to claim 11 and the migration means concerned is characterized by being the gas which contains helium (helium) at least.

[Claim 13] The manufacture approach of hemanalysis equipment that the part or the gas all introduced into a part of maintenance means concerned of passage means concerned to connect before and after a migration means according to claim 11 and the migration means concerned is characterized by being the gas which contains oxygen (O2) at least.

[Claim 14] Hemanalysis equipment with which a resin material according to claim 1 is characterized by being especially PET (polyethylene terephthalate).

[Claim 15] Part or all of the passage means concerned that connects before and after the migration means concerned and the migration means concerned in hemanalysis equipment according to claim 1, and a part of maintenance means concerned — at least — HMDS (hexamethyldisilazane —) (CH3) The manufacture approach of the hemanalysis equipment which covers with silicon oxide the front face of a part where the component which introduced the solvent containing 3SiNHSi (CH3)3, was made to dry in each means concerned, and was extracted from the blood or blood of each means concerned touches.

[Claim 16] An extraction means to extract blood from in the living body in the substrate made of one or more resin, Among separation means to separate a blood serum from a filtration means to filter the blood concerned extracted at least and to obtain plasma, or the blood concerned, one of means, An analysis means to analyze the matter in the blood concerned, and the extraction means concerned, the filtration means concerned, the separation means concerned and a passage means to connect the analysis means concerned, The extraction means concerned, the filtration means concerned, the separation means concerned, the analysis means concerned, and the migration means to which the component of the blood concerned which exists in the passage means concerned is moved, The control means for controlling actuation of at least one means of the output means for taking out the information from the analysis means concerned outside, the extraction means concerned and the filtration means concerned, the separation means concerned, the analysis means concerned, the migration means concerned, and the output means concerned, In hemanalysis equipment equipped with the maintenance means made of the resin for holding the component of the blood concerned in the substrate concerned Part or all of the passage means concerned that connects each means of the filtration means concerned to the analysis means concerned, the analysis means concerned, and the migration means concerned, And maintain a part of maintenance means concerned at a reduced pressure condition, and the solvent containing the organic molecule which has biocompatibility is poured into each means concerned. Then, part or all of the passage means concerned that the solvent concerned is volatilized and connects each

means of the filtration means concerned to the analysis means concerned, the analysis means concerned, and the migration means concerned, And the manufacture approach of the hemanalysis equipment characterized by covering some front faces of the maintenance means concerned with the organic molecule which has the biocompatibility concerned.

[Claim 17] The manufacture approach of hemanalysis equipment that the organic molecule which has biocompatibility according to claim 16 is characterized by being especially an MPC (2-methacryloyloxyethylphorylcholine) polymer.

[Claim 18] The manufacture approach of hemanalysis equipment that the organic molecule which has biocompatibility according to claim 16 is characterized by being especially a polyethylene glucose.

[Claim 19] The manufacture approach of hemanalysis equipment that the polyethylene glucose according to claim 18 has covered the front face of the spherical poly lactide in the shape of a mustache, and such a macromolecule micell is all characterized by a part of passage means to connect each means of a filtration means according to claim 16 to an analysis means, an analysis means, and a migration means, or having covered some front faces of a maintenance means.

[Claim 20] The manufacture approach of the hemanalysis equipment characterized by a resin material according to claim 16 being PET (polyethylene terephthalate).

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention extracts blood, separates the erythrocyte in blood, a leucocyte, a lymphocyte, a platelet, a blood coagulation factor, etc., and relates to the hemanalysis approach and equipment which measure the concentration of the pH value of the blood serum obtained as a result, oxygen, or a carbon dioxide. Especially, functions required for the above-mentioned actuation and all the structures are accumulated into one device, the device is still smaller, and the knowledge of special medicine and rating are not needed for the handling, but it is related with the health care device characterized by performing the above-mentioned hemanalysis simply.

[0002]

[Description of the Prior Art] As electronic equipment which diagnoses people's health condition and illness, there is a blood automatic analyzer else [, such as a thermometer, a sphygmomanometer, ultrasonic diagnosis, X-ray CT, and MRI,]. This extracts several ml blood, divides into many test tubes the blood serum obtained by separating an erythrocyte, a leucocyte, a lymphocyte, a platelet, and a blood coagulation factor using a centrifugal separation machine, and puts in order and moves each test tube to a single tier. By the chemical sensor and also it measures each concentration, such as pH, oxygen, and a carbon dioxide, — the blood serum of each test tube — reagents, such as an enzyme, — putting in — the spectrum of a luminous

reaction with the substrate in a blood serum, and absorption — it is used for performing a spectrum, processing data by computer and diagnosing the body.

[0003] Usually, such an automatic analyzer was installed in medical institutions, such as a hospital, the scale was large and the actuation was also restricted to what has special rating. However, such an automatic analyzer is replaced in recent years, and the small simple hemanalysis approach and hemanalysis equipment which aimed at carrying out the hemanalysis by one's hand at each home are developed.

[0004] The outline of such hemanalysis equipment is shown in drawing 1 . 101 is a substrate and each means of this equipment shown below is constituted by the micro capillary. 102 is the extraction means of blood. 103 is a needle in the air and is attached to an extraction means. 104 which stabs the inside of the body with this needle, and is used as the intake of the blood into a substrate, and 105 are electrodes, and take in blood in a substrate from the inside of the body with the suction force by the electroendosmose style produced for the electrical potential difference impressed to inter-electrode [this]. 106 is the filtration means of blood and has two or more slits which become narrow [spacing] gradually toward a lower stream of a river from the upstream of the flow of blood. By this slit, the erythrocyte in blood, a leucocyte, a lymphocyte, and a platelet are filtered and removed, and plasma is obtained to the downstream of a filtration means. 107 is a separation means, for example, consists of a micro capillary of a U character mold. After leading the plasma which filters the extracted blood and is obtained to this U character type of micro capillary, the blood serum which carried out separation removal of the coagulation factor from plasma is obtained by the U character section by applying acceleration in the fixed direction for this substrate with a centrifugal separation vessel. 108 is an analysis means and has a sensor for measuring each concentration, such as the pH value in blood, oxygen, a carbon dioxide, sodium, a potassium, calcium, a glucose, and a lactic acid. 109 is a passage means to connect each of an extraction means, a filtration means, a separation means, and an analysis means, and consists of a micro capillary which etched and manufactured the substrate. 110 is a migration means for moving blood by the electroendosmose style in a micro capillary. 111 is an output means for taking out information from an analysis means, and consists of electrodes etc. 112 is a control means for controlling the above extraction means, a filtration means, a separation means, an analysis means, a migration means, and an output means if needed. Although not illustrated, it has a maintenance means for holding blood in the micro capillary on a substrate, and this plate is pasted up or stuck to the substrate 101 by pressure.

[0005] It is filtered with the filtration means 104 and becomes plasma, and separation removal of the coagulation factor is further carried out with the separation means 105, a blood serum is obtained, and the blood extracted by the extraction means 102 measures each concentration, such as a pH value, oxygen, a carbon dioxide, sodium, a potassium, calcium, a glucose, and a lactic

acid, for this in an analysis means. The migration means 110 which used the electrophoresis method performs migration of the blood between each means.

[0006] Although glass ingredients, such as a quartz, were used for the substrate of such hemanalysis equipment in many cases, a resin material came to be used as what is suitable holding down costs and manufacturing equipment in large quantities again.

[0007]

[Problem(s) to be Solved by the Invention] however, since surface F-potential is low when a resin material is used as a substrate, if the capacity of the pump action in a migration means 110 to use an electroendosmose style declines, the problem acquired and said has arisen. Moreover, although the macromolecule micell which has the straight chain of the organic material which has biocompatibility, for example, an MPC (2-methacryloyloxyethylphorylcholine) polymer, and a polyethylene glycol (PEG) on a front face needed to be covered with the part which the whole blood or the blood serum of the extraction means 102, the filtration means 106, the separation means 107, and the analysis means 108 contacts on the front face in order to suppress adhesion of protein and a corpuscle, the approach of covering the inside of a micro capillary efficiently was needed.

[0008]

[Means for Solving the Problem] First, it is effective to form silicon oxide in the wall front face of the migration means 110, in order to raise the pump capacity by electroendosmose style operation in the migration means 110, and to make surface F-potential increase. Covering by the silicon oxide on this front face of a wall is realized by introducing HMDS (hexamethyldisilazane, 3(CH3) SiNHSi3 (CH3)) into a part or all of a passage means that connects before and after a migration means and a migration means, raising the temperature of the whole chip after that, and evaporating a solvent. To or a part or all of a passage means that connects before and after a migration means and a migration means similarly Perform plasma chemistry-gaseous-phase deposition of silicon oxide by introducing the gas of the molecule which contains silicon as a configuration element at least, and the gas of the molecule which contains oxygen as a configuration element at least, and generating the plasma of a capacity mold or an induction type there, or Or after introducing these gases, covering of silicon oxide can be performed by the photochemistry-gaseous-phase deposition which irradiates the part which wants to cover the light containing the wavelength of an ultraviolet area, and covers only the front face of the part. Moreover, a gas is introduced into a part or all of a passage means that connects before and after a migration means and a migration means, it is generating the plasma of a capacity mold or an induction type there, and this wall front face is reformed and F-potential is raised. It is also effective to add oxygen (O2) into the gas introduced at this time, and to carry out oxidation reforming of the front face.

[0009] Moreover, in order to cover the wall of a micro capillary with an MPC polymer or a macromolecule micell, a part of maintenance means is maintained at a reduced-pressure condition, a part of passage means 109 connect the part, the analysis means 108, and the migration means 110 from the extraction means 102 to the analysis means 108, or the solvent which includes an MPC polymer and a macromolecule micell with the suction force is poured in, a solvent is volatilized and an MPC polymer and a macromolecule micell front face are all covered with these after that.

[0010]

[Embodiment of the Invention] The schematic diagram of the equipment based on this invention is shown in drawing 2 . The same number as drawing 1 shows the thing same all over drawing as drawing 1 . Here, the example which covered migration means 110 wall with silicon oxide 201 is shown. 202 is the covering film by the MPC polymer or the macromolecule micell, and is wearing some wall front faces of the extraction means 102 to an a part or all of a passage means 109 to connect the part, the analysis means 108, and the migration means 110 to the analysis means 108, and a maintenance means.

[0011]

[Example] The [first example] An example is shown in drawing 3 . The same number as drawing 1 or drawing 2 shows the thing same all over drawing as drawing 1 or drawing 2 . Drawing 3 shows the substrate 101 before performing covering of silicon oxide, and coating of an MPC polymer or a giant-molecule micell. Although not illustrated, the plate of PET is stuck to the substrate 101 by pressure as a maintenance means for holding blood or a blood extract component for the migration means 110 from the extraction means 102 formed in the substrate 101. 301 in drawing shows the hole which was able to be made in the PET plate which is this maintenance means. This hole 301 is located in the place of a passage means 109 to connect the analysis means 108 and the migration means 110, and has exposed a part of passage means 109 of this part. And a septum 302 is formed in a part of migration means 110 of the part exposed by this hole 301. A septum 302 is gel and puts this in a part of migration means 110. The field shown with the slash in drawing shows a septum 302. This becomes possible to separate the field by the side of the downstream 110, i.e., a migration means, from a septum 302 from a septum 302 an upstream 102, i.e., extraction means, side, and to maintain both fields at an airtight, respectively.

[0012] Drawing 4 explains formation of silicon oxide. From this septum 302, HMDS was introduced into the migration means 110 side, it installed on the hot plate which kept the substrate itself at about 50 degrees C, and the solvent of HMDS was evaporated. Then, when filled the migration means 110 with PBS (phosphate buffer solution), and red dyes (Rhodamine B) were added, the electrical potential difference was impressed among electrodes 104 and 105 and the applied-voltage dependency of whenever [electroendosmose rate-of-flow] was investigated

from the passing speed of these red dyes, it came to be shown in drawing 5 . It unites with this drawing and the unsettled thing is also shown in coincidence. It turns out that whenever [electroendosmose rate-of-flow] is large in the applied voltage with the same direction at the time of from now on carrying out an adhesion promoter coat as compared with the case of being unsettled. Rather than what has this unsettled since the wall of the migration means 110 was covered with this adhesion promoter coat by silicon oxide, F-potential becomes large and it is thought that whenever [high as result electroendosmose rate-of-flow], i.e., high pump capacity, was obtained. When the part of the migration means 110 after this adhesion promoter coat was investigated by X-ray photoelectron spectroscopy, the wall front face actually became clear [being covered by silicon oxide].

[0013] Next, drawing 6 explains MPC polymer covering of the wall by the side of the extraction means 102 from a septum 301. First, from a septum 302, the extraction means 102 side is maintained at reduced pressure, and an MPC polymer is introduced in the passage on a substrate with this suction force. Then, it was made to leave and dry under atmospheric pressure. Consequently, the covering film 501 of an MCP polymer was formed in the wall by the side of the extraction means 102 from the septum 302. The thickness of the result of electron microscope observation of a cross section to this covering film was about 180nm. After covering this MPC polymer, whole blood was introduced on the chip from the extraction means 102, and whole blood was led to the separation means 107, without passing through the filtration means 106 in this case, and when the consistency of the erythrocyte adhering to the wall of a part with which that blood serum component when centrifugal separation separates whole blood into a corpuscle component and a blood serum component here has collected was investigated, it came to be shown in drawing 7 . It is shown as compared with the case where the MPC polymer is not covered in this drawing. There is little erythrocyte to which the direction at the time of covering with an MPC polymer has adhered positively, and it can control adhesion in the wall of the corpuscle component of blood by covering a wall with an MPC polymer from this so that clearly from this drawing.

[0014] In addition, after giving silicon oxide formation shown in the substrate 101 above, or MPC polymer covering, a septum 302 is removed, a hole 301 is plugged up and the hemanalysis by the substrate 101 is performed. A hole 301 sticks by pressure and closes the PET plate which carried out the same configuration as a hole 301, and it was made for blood or a blood extract component not to leak. Moreover, the analysis means 108 may also close a hole 301 instead of a PET plate. Moreover, an MPC polymer may be covered for the part of a passage means 109 by which it has exposed by the hole 301, at this time. Thus, when extraction of a series of whole blood, separation, and analysis were performed using the migration means 110 using the produced hemanalysis equipment, it was able to perform without the problem.

[0015] The [second example] In covering the silicon oxide of migration means 110 wall of drawing

4 as the molecule which contains silicon as a configuration element in this migration means 110 — TEOS (a tetra-ethoxy silane —) Oxygen was introduced as a molecule which contains Si (OC2H5)4 and oxygen as a configuration element, the electrode was installed in the substrate outside of this migration means 110, the RF (frequency: 13.56MHz) was impressed to this 10W, and the microplasma was generated within the migration means 110. After performing this processing for 1 minute, when whenever [electroendosmose rate-of-flow / which was stated in the 1st example] was measured with the unsettled thing, its direction was clearly large although the rate concerned performed mixture-of-gas plasma treatment of TEOS and oxygen rather than the unsettled thing. Moreover, when the migration means 110 interior after performing the plasma treatment concerned was investigated by X-ray photoelectron spectroscopy, it became clear that the wall front face was covered by silicon oxide. That is, it is shown that the wall front face was covered with the plasma treatment concerned by silicon oxide, F-potential high as a result was obtained, and whenever [high electroendosmose rate-of-flow], i.e., the high pump force, was obtained.

[0016] The [third example] In covering the silicon oxide of migration means 110 wall of drawing 4 like the second example, the ozone which carried out silent discharge of the oxygen molecule, and generated it in this migration means 110 as a molecule which contains TEOS and oxygen as a configuration element as a molecule which contains silicon as a configuration element was introduced, and this processing was performed for 1 minute. When whenever [electroendosmose rate-of-flow / which was stated in the 1st example] was measured with the unsettled thing, its direction was clearly large although the rate concerned performed mixture-of-gas processing of TEOS and ozone rather than the unsettled thing. Moreover, when the migration means 110 interior after performing the processing concerned was investigated by X-ray photoelectron spectroscopy, it became clear that the wall front face was covered by silicon oxide. Therefore, it is shown like the second example that the wall front face was covered with the processing concerned by silicon oxide, F-potential high as a result was obtained, and whenever [high electroendosmose rate-of-flow], i.e., the high pump force, was obtained.

[0017] The [fourth example] In covering the silicon oxide of migration means 110 wall of drawing 4 like the second and 3 example The oxygen molecule was introduced in this migration means 110 as a molecule which contains a silane (SiH4) and oxygen as a configuration element as a molecule which contains silicon as a configuration element, and the deuterium lamp was irradiated for 1 minute by output 100W from the substrate outside of this migration means 110. After this processing, when whenever [electroendosmose rate-of-flow / which was stated in the 1st example] was measured with the unsettled thing, although the rate concerned performed deuterium lamp exposure processing to the mixture of gas of a silane and oxygen rather than the unsettled thing, its direction was clearly large. Moreover, when the migration means 110 interior

after performing the processing concerned was investigated by X-ray photoelectron spectroscopy, it became clear that the wall front face was covered by silicon oxide. Therefore, it is shown like the second and 3 example that the wall front face was covered with the processing concerned by silicon oxide, F-potential high as a result was obtained, and whenever [high electroendosmose rate-of-flow], i.e., the high pump force, was obtained.

[0018] The [fifth example] As an approach to which F-potential is made to increase from covering the migration means 110 wall front face of drawing 4 by silicon oxide by other approaches, the inside of the migration means 110 on a PET substrate is filled with helium (helium) with a pressure of 0.4Pa, an electrode is installed in the substrate outside of the migration means 110 after that, a RF (frequency: 13.56MHz) is impressed to this 10W, and a microplasma is generated within this migration means 110. The impression electric-field dependency of whenever [in this migration means 110 after generating a microplasma (output: 10W) with the atmospheric pressure helium which added the helium of atmospheric pressure or oxygen (O2) 3% similarly and performing surface treatment / electroendosmose rate-of-flow] is shown in drawing 8 . Whenever [this electroendosmose rate-of-flow] was estimated here by observing the passing speed of the particle when filling PBS, making the particle made from polyethylene become muddy here, and impressing electric field in the migration means 110. When various plasma treatment is performed from this drawing, as compared with the unsettled case where neither performs plasma treatment, whenever [high electroendosmose rate-of-flow] is obtained. This shows that reforming of the migration means 110 wall front face was carried out by the plasma treatment concerned, high F-potential was obtained in this front face, and whenever [high as result electroendosmose rate-of-flow], i.e., the high pump force, was obtained. When the migration means 110 wall front face on the PET substrate after the plasma treatment concerned is investigated by X-ray photoelectron spectroscopy, the oxygen density on the front face of a wall is high from the unsettled thing, and is considered to have contributed to the rise of F-potential which oxidation of such a front face mentioned above.

[0019] The [sixth example] Instead of covering the wall by the side of the extraction means 102 with an MPC polymer from the septum 302 of drawing 6 stated in the first example, it tried to cover with a macromolecule micell. As shown in drawing 9 , mustache-like polyethylene glycose (PEG) has combined with the front face of the globular form poly lactide (PLA) innumerably the giant-molecule micell used here. First, a septum 302 is formed in a passage means 109 to connect 110 here, using a quartz as a substrate 101 of drawing 6 . Next, from a septum 302, the extraction means 102 side is maintained at reduced pressure, APTS (3-aminopropyltriethoxysilane) diluted with toluene 100 times with this suction force is poured into the extraction means 102 side from a septum 302, and termination of the side-attachment-wall front face of a quartz is carried out by the amino group by silane coupling. A solvent including a macromolecule micell as shown in drawing

9 after that is poured into the extraction means 102 side from a septum 302, and the macromolecule micell concerned is chemically combined with a quartz front face. Since it combines only with the amino group chemically, association of the carbon, hydrogen, and oxygen of the end of PEG which constitutes a macromolecule micell at this time, and CHO are firmly combined with the front face of the quartz by which termination was carried out by the amino group. Thus, after covering a macromolecule micell on the wall front face of a quartz, whole blood is introduced on a chip from the extraction means 102 like the first example. The place which investigated the consistency of the erythrocyte adhering to the wall of a part with which that blood serum component when whole blood is led to the separation means 107, without passing through the filtration means 106 also in this case and centrifugal separation separates whole blood into a corpuscle component and a blood serum component here has collected, Although the macromolecule micell was not covered, when a macromolecule micell was covered to about 550 adhesion erythrocyte consistencies /having been [mm] 2, about ten pieces /were [mm] 2. From now on, adhesion in the wall of the corpuscle component of blood can be controlled by covering a wall with a macromolecule micell so that clearly.

[0020] Moreover, although covering of the macromolecule micell at the time of using a quartz substrate here was described, when a substrate is resin like PET, after performing above-mentioned silane coupling once covering silicon oxide for a wall first, as the fourth example described from the first and carrying out amino-group termination of the front face, a macromolecule micell is covered on a front face.

[0021] After covering silicon oxide and a macromolecule micell in a proper place as mentioned above, when the septum 301 was removed and extraction of a series of whole blood, separation, and analysis were performed using the migration means 110, it was able to perform without the problem.

[0022] The [seventh example] As the sixth example described, adhesion of the corpuscle in blood can be controlled by covering a macromolecule micell on front faces, such as resin and a quartz. However, this processing needs to carry out termination of the front face of silicon oxide or a quartz by the amino group by silane coupling, and is a little complicated. Here, using PET as a substrate, first, from a septum 302, the extraction means 102 side is maintained at reduced pressure, the solvent containing PLA is slushed into the extraction means 102 side from the septum 301 of drawing 3 , a solvent is volatilized, and PLA is covered with this suction force to a wall. The solvent which contains PEG in after an appropriate time is slushed similarly, a solvent is volatilized, and PEG is covered on PLA. The situation of this covered front face is shown in drawing 10 . Thus, after covering PEG to a wall, whole blood is introduced on a chip from the extraction means 102. The place which investigated the consistency of the erythrocyte adhering to the wall of a part with which that blood serum component when whole blood is led to the

separation means 107, without passing through the filtration means 106 also in this case and centrifugal separation separates whole blood into a corpuscle component and a blood serum component here has collected, Although PEG was not covered, when PEG was covered to about 550 adhesion erythrocyte consistencies /having been [mm] 2, about eight pieces /were [mm] 2. From now on, adhesion in the wall of the corpuscle component of blood can be controlled by covering a wall with PEG so that clearly.

[0023] When the septum 301 was removed and extraction of a series of whole blood, separation, and analysis were performed using the migration means 110 after covering PEG from the septum 301 of drawing 3 to the extraction means 102 side as mentioned above and covering silicon oxide from a septum 301 to the migration means 110 side, it was able to perform without the problem.

[0024]

[Effect of the Invention] With the hemanalysis equipment by this invention, it became possible by forming silicon oxide in the wall of a migration means to cover a wall until it can raise the pump capacity of a migration means and results [from an extraction means] in an analysis means by the manufacture approach of the hemanalysis equipment by this invention with an MCP polymer, a macromolecule micell, or PEG to homogeneity as stated above.